MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2016/2017

DCT5038 – DATA COMMUNICATIONS AND NETWORKING

(DIT & DBIS)

18 OCTOBER 2016
2:30 p.m – 4:30 p.m
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This question paper consists of **4** pages.
2. Answer ALL questions.
3. Write your answers in the answer booklet provided.

Instruction: *Answer all questions in the Answer Booklet provided.*

QUESTION 1

[25 Marks]

a. Define the following terms below:

i. Frequency (1 Mark)

ii. Wavelength (1 Mark)

iii. Bit rate (1 Mark)

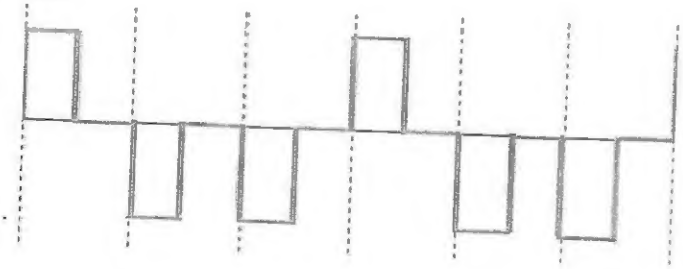
iv. Attenuation (1 Mark)

b. Assume that a signal travels from an earth station takes 150 *ms* to reach a satellite on the outer space. If the propagation speed is 90% of the speed of light, calculate the distance. (3 Marks)

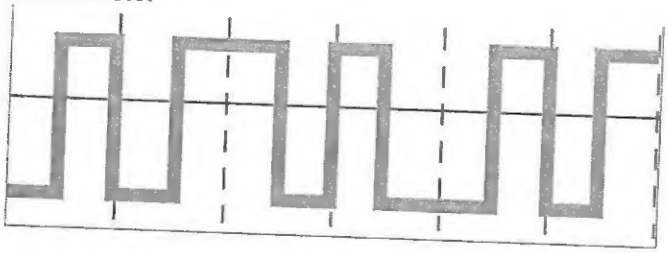
c. Draw a time domain given that a signal has peak amplitude of 10V, period of $\frac{1}{4}$ second and radian of $\frac{\pi}{2} rad$ with respect to time 0. (4 Marks)

d. Determine the data stream for the following encoding schemes below.

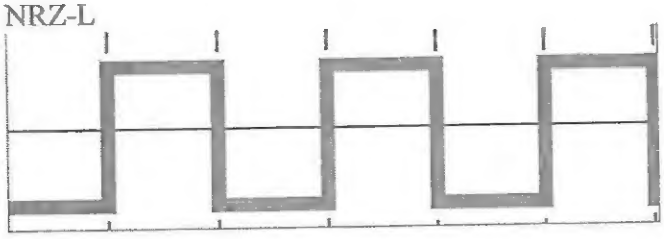
i. RZ (2 Marks)



ii. Manchester (2 Marks)



iii. NRZ-L (2 Marks)



e. A 32-QAM is used to convert a digital signal to analog signal. Assuming that the bit rate is 4,000 bps, calculate the baud rate of the network. (3 Marks)

f. ***Figure 1*** shows an 8-QAM constellation diagram. Draw the corresponding time domain signal with the appropriate tribit. (5 Marks)

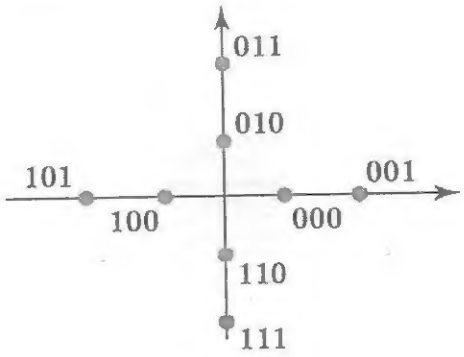


Figure 1

QUESTION 2 [15 Marks]

a. Distinguish between frequency-division multiplexing (FDM), wavelength-division multiplexing (WDM) and time-division multiplexing (TDM). (6 Marks)

b. There are 7 sources are multiplexed together using TDM. Each input source has a bit rate of 500 kbps. Assuming that each output slot carries 5 bits from each source at a time and an additional 2 bits are added for synchronization.

i. Size of a frame in bit. (2 Marks)

ii. Frame rate on the output. (2 Marks)

iii. Data rate on the output. (2 Marks)

c. Define frequency hopping spread spectrum (FHSS) and explain how it achieves bandwidth spreading. (3 Marks)

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QUESTION 3

[25 Marks]

a. Construct the Hamming code for the bit sequence 110011 and determine the complete bits that will be sent by the sender. After this, assuming that the corresponding code is transmitted successfully, prove that the bits sent has no error occurred at receiver.
(11 Marks)

b. Briefly explain the operation of *piggybacking* in ARQ with the aid of diagram. *(Note: You are require to provide a brief explanation of your diagram.)*
(5 Marks)

c. Assume that a system uses Selective Repeat ARQ with a window's size of 2 (W=2). Complete the diagram in ***Figure 2*** if frame 2 is lost during transmission.
(6 Marks)

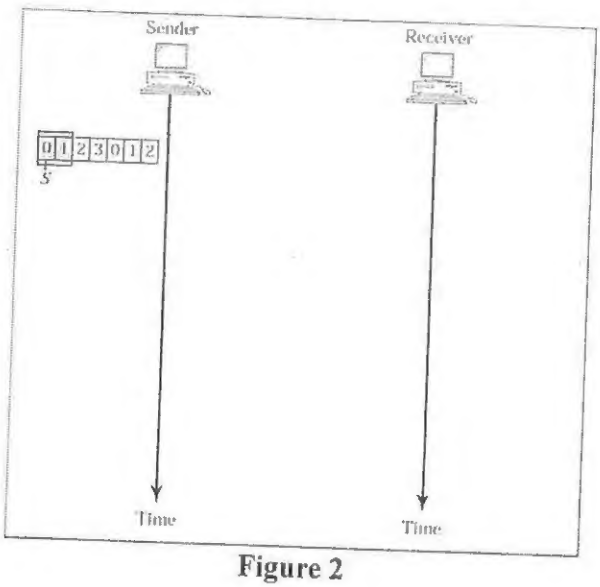

Figure 2

d. Briefly explain *random access* method in multiple access protocol. (3 Marks)

QUESTION 4

[25 Marks]

a. Give **TWO (2)** advantages and **TWO (2)** disadvantages of optical fiber.
(4 Marks)

b. Define unguided media and list **THREE (3)** major classes of unguided media.
(5 Marks)

c. What are the **TWO (2)** types of networks defined by IEEE 802.15? Further explain these two networks.
(8 Marks)

d. There are two important types of bridges, *simple bridge* and *learning bridge*. Explain and provide **ONE (1)** advantage and **ONE (1)** disadvantage for both of them. (6 Marks)

e. Define Virtual Local Area Network (VLAN). (2 Marks)

QUESTION 5

[10 Marks]

a. Provide **THREE (3)** features of a frame relay network. (6 Marks)

b. ***Figure 3*** shows a multiplexing of two input sources using different frame size. What will happens when line 1 uses large frames while line 2 uses very small frames? (2 Marks)

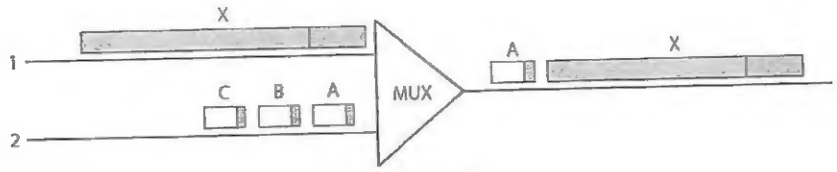

Figure 3

c. What are the two identifiers to identify an Asynchronous Transfer Mode (ATM) virtual connection? (2 Marks)

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